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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/805,216	03/14/2001	Shinya Kobayashi	HO4-3303/HO	8566
30743	7590	11/19/2003	EXAMINER	
WHITHAM, CURTIS & CHRISTOFFERSON, P.C. 11491 SUNSET HILLS ROAD SUITE 340 RESTON, VA 20190			NGUYEN, LAM S	
			ART UNIT	PAPER NUMBER
			2853	

DATE MAILED: 11/19/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/805,216

Applicant(s)

KOBAYASHI ET AL.

Examiner

LAM S NGUYEN

Art Unit

2853

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 04 September 2003.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 2-14 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 2-8 and 12-14 is/are rejected.
- 7) ☒ Claim(s) 9-11 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 17 March 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

DETAILED ACTION

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

1. Claims 2-6, 12-14 are rejected under 35 U.S.C. 102(e) as being anticipated by Wen et al. (US 6046822).

Wen et al. discloses an image forming device comprising:

a head formed with a plurality of nozzles (FIG. 1a, element 47);

a converting unit (in term of “calibrator”) that converts recording data (in term of “the pixel values”) into driving data (in term of “waveform index numbers”), the driving data including data sets defining driving pulses for corresponding ones of the plurality of nozzles (column 1, line 66 to column 2, line 3);

a feed unit that feeds a recording medium in a first direction (FIG. 5: a feeder feeds the printing medium (element 120));

an ejection element (FIG. 1b, element 260) provided to each one of the plurality of nozzles (FIG. 1b, element 45) for ejecting an ink droplet (FIG. 1b, element 1b) from the corresponding nozzle onto the recording medium in response to the driving data while the feed unit is feeding the recording medium in the first direction; and

a memory that stores nozzle profile data (in term of “a droplet placement

Art Unit: 2853

characteristic”) (column 1, line 50-53: teaching a nozzle has a droplet placement characteristic associate therewith. Thus, there must be a memory to store this characteristic data such as Look-Up-Table introduced in column 2, line 40-45)) including waveform data and timing data for each of the plurality of nozzles, the waveform data and the timing data (column 2, line 13-15) indicating a waveform and a generating timing, respectively, of the driving pulse for each one of the plurality of nozzles (column 1, line 50-57), wherein the converting unit converts the recording data into the driving data based on the nozzle profile data, and each of the driving pulses is defined by a plurality of data sets of the driving data (column 1, line 66 to column 2, line 3).

an updating unit that updates the waveform data for each of the plurality of nozzles when a printing condition has been changed (column 5, line 38-56: a corresponding updating unit that adjusts landing times and associated time delays according to the replacement variability).

Referring to claim 3:

a designating unit that designates a target ink amount of the ink droplet and a target impact position on the recording medium on which the ink droplet impacts; a measuring unit that measures a distance between the target impact position and an actual impact position on the recording medium where the ink droplet has impacted with respect to the first direction (column 5, line 38-45: the deviations of the ink spots from the ideal placement locations are calculated); and

an updating unit that updates the nozzles profile data based on the target impact

Art Unit: 2853

position and the distance measured by the measuring unit (column 5, line 38-51: a corresponding updating unit that updates the nozzle profile data, in term of “landing times” and associated “time delays” according to the replacement variability).

Referring to claim 4: wherein the updating unit includes a first unit and a second unit, the first unit updating the waveform data of the nozzle profile data so as to change the ejected ink amount of the ink droplet (column 5, line 17-20: ink droplets with different volumes are activated by different waveforms), the second unit updating the timing data of the nozzle profile data so as to control the actual impact position with respect to the first direction (column 5, line 45-55: The ink droplet landing time is increased by a proper duration in order to eject ink droplets on the ideal printing line).

Referring to claim 5: wherein each of the driving pulses includes a pluralit of sub pluses which are determined by the waveform, wherein adjacent two of the plurality of sub pulses are divided by a split time (FIG. 3).

Referring to claim 6: wherein each of the driving pulses has a time width which is determined by the waveform data of the nozzle profile data, and the first unit updates the waveform data so as to change at least of one the time width of each of the driving pulses (FIG. 3: W1, W2, W3), the split time of each of the driving pluses (FIG. 3: S1-2, S2-3), and a pulse duty of the driving pulses (FIG. 3: either W1-W3 or A1-A3) (column 6, line 20-32: a set of parameters is selected for a waveform).

Referring to claim 12: a leveling unit that levels generating timings of the driving pulses by changing the timing data of the nozzle profile data (column 5, line 38-51: a corresponding leveling unit that levels generating timings in term of “landing times” and associated “time

Art Unit: 2853

delays” according to the replacement variability; Column 2, line 11-15: control timing of the waveforms to compensate for physical variabilities between nozzles).

Referring to claim 13: a resolution changing unit that changes a time resolution, wherein each one of the plurality of data sets of the driving data having an original time resolution, and the resolution setting unit that sets the original time resolution of each of the data sets to a predetermined time resolution and wherein the original time resolution determines the waveform of each of the driving pulses, and the predetermined time resolution determines the generating timing of each of the driving pulses (column 5, line 38-49: a corresponding resolution changing unit that changes a time resolution in termed of “landing times” and associated “time delays” according to the replacement variability).

Referring to claim 14: wherein the original time resolution determines the waveform of each of the driving pulses and the predetermined time resolution determines the generating timing of each to driving pulses (column 4, line 13-24: predetermined pulse width and time delays between pulses).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claim 7 is rejected under 35 U.S.C. 103(a) as being unpatentable over Wen et al. (US 6046822) in view of Mizoguchi et al. (US 5438437).

Wen et al. disclose the claimed invention as discussed above and also disclose wherein the driving element includes a piezoelectric element and an element driver that controls the piezoelectric element, the element driver outputting a driving signal to the piezoelectric element in response to the driving data (column 8, line 14-27). However, Wen et al. do not disclose the comprising of a smoothing unit provided to the driving element wherein the smoothing unit smoothes the driving signal output from the element driver.

Mizoguchi et al. disclose an image forming apparatus having a smoothing processor to control the dot size and dot positions to improve resolution (Abstract and column 1, line 60-68).

Therefore, it would have been obvious for one having ordinary skill in the art at the time the invention was made to include the smoothing unit as disclosed by Mizoguchi et al. into the printing apparatus disclosed by Wen et al. to smoothe the driving signals. The motivation of doing so is to control the dot size and dot positions to improve resolution and conduct smoothing on an image as taught by Mizuguchi et al. (Abstract and column 1, line 60-68).

3. Claim 8 is rejected under 35 U.S.C. 103(a) as being unpatentable over Wen et al. (US 6046822) in view of Sachs et al. (US 5807437).

Wen et al. disclose the claimed invention as discussed above except the comprising of a deflection electric field generating unit and a charging electric field generating unit, the deflection electric field generating a deflection electric field in a space defined between the recording medium and the head, the deflection electric field having a field element in a second direction substantially perpendicular to the first direction and a third direr ' on in which the ink droplet is ejected, the charging electric field generating unit generating a charging electric filed in the plurality of nozzles, the charging electric field having a field element in the third direction.

Art Unit: 2853

Sachs et al. disclose a printing system comprising of a deflection electric field generating unit (FIG. 4, element 25) and a charging electric field generating unit (FIG. 4, element 23), the deflection electric field generating a deflection electric field in a space defined between the recording medium (FIG. 4, element 30) and the head (FIG. 4, element 19), the deflection electric field having a field element in a second direction substantially perpendicular to the first direction and a third direction in which the ink droplet is ejected, the charging electric field generating unit generating a charging electric field in the plurality of nozzles (FIG. 4, element 22), the charging electric field having a field element in the third direction for three-dimensional printing purpose.

Therefore, it would have been obvious for one having ordinary skill in the art at the time the invention was made to include the deflection electric field generating unit and the charging electric field generating unit for generating a deflection electric field in a second direction and a charging electric field in the plurality of nozzles in the third direction as disclosed by Sachs et al. into the printing system disclosed by Wen et al. The motivation of doing so is to achieve a precise drop placement with high deposition rates utilizing an array of binary continuous jets in a single printhead as taught by Sachs et al. (column 4, line 44-48).

Allowable Subject Matter

4. Claims 9-11 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Referring to claim 9: The most pertinent art fails to disclose the comprising of the first and second measuring units that measure a first and second distance between the target impact position and an actual impact position on the recording medium where the ink droplet has

Art Unit: 2853

impacted with respect to the first and second direction, and an updating unit that updates the nozzle profile data based on the target impact position, the first and second distances. Therefore, the claimed invention is not disclosed by the cited art.

Claims 10-11 are allowable because they depend directly/indirectly on claim 9.

Response to Arguments

Applicant's arguments filed 09/04/2003 have been fully considered. The examiner admits that the Akahira reference is not a valid reference because its publication date was after the foreign priority date of the application. Therefore, all rejections relied on the Akahira reference are withdrawn.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to LAM S NGUYEN whose telephone number is (703)305-3342. The examiner can normally be reached on 7:00AM - 3:30PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, STEPHEN D. MEIER can be reached on (703)308-4896. The fax phone numbers for the organization where this application or proceeding is assigned are (703)305-3431 for regular communications and (703)305-3432 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703)308-0956.

LN

November 14, 2003

Hai Pham

HAI PHAM
PRIMARY EXAMINER